

CLAIMS

1. A laminated bandpass filter comprising:

an input electrode, output electrode and grounding electrode placed on an end face of a laminated body integrating a plurality of laminated dielectric sheets;

an internal grounding electrode provided in an internal layer of said laminated body and connected to said grounding electrode;

a plurality of capacitor electrodes including at least a first and second capacitor electrodes; and

a plurality of strip lines including at least a first and second strip lines,

wherein said first and second capacitor electrodes are capacitatively coupled with said internal grounding electrode and electrically connected to one ends of said first and second strip lines, respectively,

the other ends of said first and second strip lines are electrically connected to the grounding electrode, and

said first and second strip lines are placed on said same dielectric sheet in a certain distance and thereby electromagnetically coupled within the same layer.

2. The laminated bandpass filter according to claim 1, wherein said first and second strip lines have the same length and width.

3. The laminated bandpass filter according to claim 1 or 2, wherein said first and second strip lines are placed in parallel with each other.

~~4. The laminated bandpass filter according to any one of claim 1 to claim 3, wherein said first and second strip lines are electrically connected to said internal grounding electrode via a via hole.~~

~~5. The laminated bandpass filter according to any one of claim 1 to claim 4, wherein only said first and second strip lines are placed on said dielectric sheet.~~

6. A laminated bandpass filter comprising:

an input electrode, output electrode and grounding electrode placed on an end face of a laminated body integrating a plurality of laminated dielectric sheets;

an internal grounding electrode provided in an internal layer of said laminated body and connected to said grounding electrode;

a plurality of capacitor electrodes including at least a first and second capacitor electrodes; and

a plurality of strip lines including at least a first and second strip lines,

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wherein said first and second capacitor electrodes are capacitatively coupled with said internal grounding electrode and electrically connected to one ends of said first and second strip lines, respectively,

the other ends of said first and second strip lines are electrically connected to the grounding electrode, and

said first strip line is placed on a first dielectric sheet and said second strip line is placed on a second dielectric sheet, and said second dielectric sheet is placed directly below said first dielectric sheet and said first and second strip lines are electromagnetically coupled.

7. The laminated bandpass filter according to claim 6, wherein said first and second strip lines have the same length, width and position within the plane.

8. The laminated bandpass filter according to claim 6 or claim 7, wherein said first and second strip lines are electrically connected to said internal grounding electrode via a via hole.

~~9. The laminated bandpass filter according to any one of claim 1 to claim 8, further comprising:~~

~~a third capacitor electrode connected to said input electrode;~~

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a fourth capacitor electrode connected to said output electrode;

a fifth capacitor electrode capacitatively coupled with said third capacitor electrode; and

a sixth capacitor electrode capacitatively coupled with said fourth capacitor electrode,

wherein capacitative coupling of an area where said third capacitor electrode and said sixth capacitor electrode overlap each other in the lamination direction forms a jump capacitance.

10. The laminated bandpass filter according to any one of claim 1 to claim 9, wherein capacitative coupling of an area where said fourth capacitor electrode and said fifth capacitor electrode overlap each other in the lamination direction forms a jump capacitance.

11. The laminated bandpass filter according to any one of claim 1 to claim 10, wherein with respect to said grounding electrode, an electrode pattern of at least one of said first and second capacitor electrodes is laminated, an electrode pattern of at least one of said first and second strip lines is laminated on a layer superior thereto, and an electrode pattern of at least one of the capacitor electrode connected to said input electrode and the capacitor electrode connected to said

output electrode is laminated on a layer superior to said layer.

12. The laminated bandpass filter according to any one of claim 1 to claim 10, wherein all electrode patterns constituting the capacitor electrode connected to said input electrode and the capacitor electrode connected to said output electrode as an input/output capacitance are provided on a layer superior to the layer constituting said strip lines.

13. The laminated bandpass filter according to claim 9, wherein with respect to said grounding electrode, an electrode pattern of at least one of said first and second capacitor electrodes is laminated, an electrode pattern of at least one of said first and second strip lines is laminated on a layer superior thereto, and an electrode pattern of at least one of said third to sixth capacitor electrodes is laminated on a layer superior to said layer.

~~14. The laminated bandpass filter according to claim 9, wherein said third to sixth capacitor electrodes are provided on a layer superior to the layer constituting said strip lines.~~

15. A laminated bandpass filter comprising:

an input electrode, output electrode and grounding electrode placed on an end face of a laminated body integrating a plurality of laminated dielectric sheets;

an internal grounding electrode provided in an internal layer of said laminated body and connected to said grounding electrode;

a plurality of capacitor electrodes including at least a first to fourth capacitor electrodes; and

a plurality of strip lines including at least first to fourth strip lines,

wherein said first to fourth capacitor electrodes are capacitatively coupled with said internal grounding electrode and electrically connected to one ends of said first to fourth strip lines, respectively,

the other ends of said first to fourth strip lines are electrically connected to the grounding electrode, and

said first and second strip lines are placed on said first dielectric sheet in a certain distance, said first and second strip lines are electromagnetically coupled within the same layer, said third and fourth strip lines are placed on the second dielectric sheet in a certain distance, said third and fourth strip lines are electromagnetically coupled within the same layer, said second dielectric sheet is placed directly below said first dielectric sheet and said first and third strip lines and said second and fourth strip lines are electromagnetically coupled respectively.

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16. The laminated bandpass filter according to claim 15, wherein said first to fourth strip lines have the same length and width, said first and third strip lines have the same position within the plane and said second and fourth strip lines have the same position within the plane.

17. The laminated bandpass filter according to claim 15 or claim 16, wherein said first and second strip lines are placed in parallel with each other and said third and fourth strip lines are placed in parallel with each other.

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A34* ~~18. The laminated bandpass filter according to any one~~
of claim 15 to claim 17, wherein said first to fourth strip lines are connected to said internal grounding electrode via a via hole.

19. The laminated bandpass filter according to any one of claim 15 to claim 18, further comprising:

a fifth capacitor electrode connected to said input electrode;

a sixth capacitor electrode connected to said output electrode;

said seventh capacitor electrode capacitatively coupled with said fifth capacitor electrode; and

said eighth capacitor electrode capacitatively coupled with said sixth capacitor electrode,

wherein capacitative coupling of an area where said fifth capacitor electrode and said eighth capacitor electrode overlap each other in the lamination direction forms a jump capacitance.

20. The laminated bandpass filter according to any one of claim 15 to claim 19, wherein capacitative coupling of an area where said sixth capacitor electrode and said seventh capacitor electrode overlap each other in the lamination direction forms a jump capacitance.

21. The laminated bandpass filter according to any one of claim 1 to claim 20, wherein said dielectric sheet is made up of a crystal phase and a glass phase, said crystal phase includes at least one of Al_2O_3 , MgO , SiO_2 and RO_a where R is at least one element selected from La, Ce, Pr, Nd, Sm and Gd and a is a numerical value determined stoichiometrically according to the valence of said R.

22. A laminated bandpass filter, said laminated body incorporating the bandpass filter according to any one of claim 1 to claim 21 and the bandpass filter according to any one of claim 1 to claim 21.

23. A composite high frequency device, wherein said laminated body incorporates the bandpass filter according to any one of claim 1 to claim 21 and another high frequency circuit.

24. A composite high frequency device, wherein electronic parts are mounted on said laminated body incorporating the bandpass filter according to any one of claim 1 to claim 21.

25. A high frequency device, characterized by comprising the laminated bandpass filter according to any one of claim 1 to claim 24.

26. A laminated bandpass filter manufacturing method comprising the steps of:

forming an input electrode, output electrode and grounding electrode on an end face of a laminated body integrating a plurality of laminated dielectric sheets;

forming an internal grounding electrode in an internal layer of said laminated body connected to said grounding electrode;

forming a plurality of capacitor electrodes including at least a first and second capacitor electrodes; and

forming a plurality of strip lines including at least a first and second strip lines,

wherein said first and second capacitor electrodes are capacitatively coupled with said internal grounding electrode and electrically connected to one ends of said first and second strip lines, respectively,

the other ends of said first and second strip lines are electrically connected to the grounding electrode, and

said first and second strip lines are placed on said same dielectric sheet in a certain distance and thereby electromagnetically coupled within the same layer.

27. A laminated bandpass filter manufacturing method comprising the steps of:

forming an input electrode, output electrode and grounding electrode on an end face of a laminated body integrating a plurality of laminated dielectric sheets;

forming an internal grounding electrode in an internal layer of said laminated body connected to said grounding electrode;

forming a plurality of capacitor electrodes including at least a first and second capacitor electrodes; and

forming a plurality of strip lines including at least a first and second strip lines,

wherein said first and second capacitor electrodes are capacitatively coupled with said internal grounding electrode and electrically connected to one ends of said first and second strip lines, respectively,

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the other ends of said first and second strip lines are electrically connected to the grounding electrode, and

said first strip line is placed on a first dielectric sheet,

said second strip line is placed on a second dielectric sheet, and

said second dielectric sheet is placed directly below said first dielectric sheet and thereby said first and second strip lines are electromagnetically coupled.

28. A laminated bandpass filter manufacturing method comprising the steps of:

forming an input electrode, output electrode and grounding electrode on an end face of a laminated body integrating a plurality of laminated dielectric sheets;

forming an internal grounding electrode in an internal layer of said laminated body connected to said grounding electrode;

forming a plurality of capacitor electrodes including at least a first to fourth capacitor electrodes; and

forming a plurality of strip lines including at least first to fourth strip lines,

wherein said first to fourth capacitor electrodes are capacitatively coupled with said internal grounding

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electrode and electrically connected to one ends of said first to fourth strip lines, respectively,

the other ends of said first to fourth strip lines are electrically connected to the grounding electrode, and

said first and second strip lines are placed on said first dielectric sheet in a certain distance, said first and second strip lines are electromagnetically coupled within the same layer,

said third and fourth strip lines are placed on said second dielectric sheet in a certain distance, said third and fourth strip lines are electromagnetically coupled within the same layer,

said second dielectric sheet is placed directly below said first dielectric sheet and said first and third strip lines and said second and fourth strip lines are electromagnetically coupled respectively.